

CLAIMS

What is claimed is:

1. An organic photosensitive optoelectronic device comprising:
 - two electrodes in superposed relation;
 - a hole transport layer between the two electrodes, the hole transport layer formed of a first photoconductive organic semiconductor material;
 - an electron transport layer between the two electrodes and adjacent to the hole transport layer, the electron transport layer formed of a second photoconductive organic semiconductor material; and
 - at least one exciton blocking layer between the two electrodes and adjacent to at least one of the electrodes.
2. The device of claim 1 wherein one exciton blocking layer is between the electron transport layer and the electrode adjacent the exciton blocking layer.
3. The device of claim 1 wherein one exciton blocking layer is between the hole transport layer and the electrode adjacent the exciton blocking layer.
4. The device of claim 1 wherein the at least one exciton blocking layer is a first exciton blocking layer and a second exciton blocking layer, the first exciton blocking layer being between the electron transport layer and the electrode adjacent the first exciton blocking layer, the second exciton blocking layer being between the hole transport layer and the electrode adjacent the second exciton blocking layer.
5. The device of claim 1 wherein the first photoconductive organic semiconductor material

and the second photoconductive organic semiconductor material are selected to have substantial spectral sensitivity in the visible spectrum.

6. The device of claim 2 wherein:

the electron transport layer is PTCBI;

the hole transport layer is CuPc; and

the exciton blocking layer is BCP.

7. The device of claim 3 wherein:

the electron transport layer is PTCBI;

the hole transport layer is CuPc; and

the exciton blocking layer is one of the group consisting of m-MTDATA or PEDOT.

8. The device of claim 1 wherein the electron transport layer, the hole transport layer, and the exciton blocking layer are disposed between two parallel planar reflective surfaces which form a waveguide.

9. The device of claim 8 wherein one of the two reflective surfaces has an aperture to admit light incident upon the device.

10. The device of claim 8 having a transparent opening between the two reflective surfaces so that light is admitted to the device from a direction parallel to the planes of the reflective surfaces.

11. A stacked organic photosensitive optoelectronic device comprised of a plurality of photosensitive optoelectronic subcells wherein at least one subcell includes an exciton blocking

layer.

12. The device of claim 10 wherein the subcell including an exciton blocking layer has an electron transport layer including PTCBI and a hole transport layer adjacent the electron transport layer and including CuPc.
13. The device of claim 11 wherein the subcell including an exciton blocking layer, the exciton blocking layer includes BCP and is adjacent the electron transport layer and in spaced opposition to the hole transport layer.
14. The device of claim 11 where, in the subcell including an exciton blocking layer, the exciton blocking layer is selected from the group consisting of m-MTDATA or PEDOT, and is adjacent the hole transport layer and in spaced opposition to the electron transport layer.
15. An organic photodetector comprising:
 - a cathode and an anode in superposed relation;
 - a plurality of pairs of a hole transporting layer adjacent to an electron transporting layer, the pairs disposed between the cathode and the anode; and
 - an exciton blocking disposed between one of the cathode and the anode, and the plurality of pairs.
16. The device of claim 14 wherein one exciton blocking layer is disposed between the anode and the plurality of pairs.
17. The device of claim 14 wherein one exciton blocking layer is disposed between the cathode and the plurality of pairs.
18. The device of claim 14 wherein the exciton blocking layer is BCP

19. The device of claim 14 wherein the exciton blocking layer is selected from the group consisting of m-MTDATA or PEDOT.
20. The device of claim 12 wherein the hole transporting layers and the electron transporting layers of the plurality of pairs are selected to have substantial spectral sensitivity in the visible spectrum.
21. The device of claim 12 wherein each pair of the plurality of pairs are CuPc and PTCBI.
22. The device of claim 12 wherein the plurality of pairs is at least 5 pairs.
23. The device of claim 12 wherein the plurality of pairs is at least 10 pairs.
24. The device of claim 12 wherein an exciton blocking layer is disposed between the anode and the plurality of pairs and the cathode and the plurality of pairs.